



# Properties & Laws of Logarithms

Objective: You will be able to simplify and solve a logarithmic function with the use of the properties and laws of logarithms.

# Properties of Logarithms

$$1.) \log_a (AB) = \log_a A + \log_a B$$

$$\log_2 (32) = ?$$

$$\log_2 (8 \cdot 4) = \log_2 8 + \log_2 4$$

# Properties of Logarithms

$$2.) \log_a \left( \frac{A}{B} \right) = \log_a A - \log_a B$$

$$\log_2(8) = ?$$

$$\log_2 \left( \frac{64}{8} \right) = ?$$



# Properties of Logarithms

$$3.) \log_a (A^C) = C \log_a A$$

$$\log_2 (512) = ?$$

$$\log_2 (8^3) = ?$$

# Properties of Logarithms

$$4.) \log_a 1 = 0 \quad a^0 = 1$$

$$\log_2(1) = ?$$

$$\log_3(1) = ?$$

$$\log_{45672}(1) = ?$$

$$\log_{2.696}(1) = ?$$



# Properties of Logarithms

$$5.) \log_a a = 1 \quad a^1 = a$$

$$\log_2(2) = ?$$

$$\log_3(3) = ?$$

$$\log_{3468}(3468) = ?$$

$$\log_{2.696}(2.696) = ?$$



# Properties of Logarithms

$$6.) \quad a^{\log_a x} = x \quad \log_a a^x = x$$

$$3^{\log_3 8} = ?$$

$$45^{\log_{45} 10} = ?$$



Ex 1: Simplify

$$\log\left(\frac{6}{5}\right)$$



Ex 2: Expand

$$\log_3 \left( \frac{a^2 b c^3}{\sqrt{d}} \right)$$



## Ex 3: Condense

$$\log_2(x-2) + \log_2(x+2)$$



## Ex 3: Condense

$$2[\log x - \log(x-1) + \log(x+2) - \log(x+1)]$$





Ex 5: Evaluate

$$\log_4 2 + \log_4 32$$